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LLNL-TR-653147

Executive Summary

A Visual Description of the Concrete Exterior of the Cactus Crater Containment Structure



Terry Hamilton

February 2014

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This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

EXECUTIVE SUMMARY

A Visual Description of the Concrete Exterior of the Cactus Crater Containment Structure

Terry F. Hamilton

Center for Accelerator Mass Spectrometry
Lawrence Livermore National Laboratory
Livermore, CA 94550
USA
hamilton18@llnl.gov

- ❑ During the Radiological Cleanup of Enewetak Atoll (1972-1980), radioactively contaminated soil was removed by excision and buried inside the Cactus nuclear test crater on Runit Island.
- ❑ The stabilized debris pile, consisting mostly of a soil-cement grout mixture with some encapsulated oversize soil and debris, structural steel and concrete, was subsequently covered over with a 45 centimeter thick, non-load-bearing layer or cap of concrete to protect the waste mound from natural erosion.
- ❑ The Cactus crater containment structure is commonly known as “*Runit Dome*”.
- ❑ The 1986 Compact of Free Association (COFA) (P.L. No. 99-239 Stat 1770) between the United States and the Republic of the Marshall Islands provides for a “full settlement of all claims, past, present and future” related to the U.S. nuclear test program in the Marshall Islands.
- ❑ P.L. 112-149 was developed to provide U.S. legislative authority outside of COFA and the U.S. Department of Energy’s Marshall Islands Program to address radiological concerns about leakage of radioactive waste from *Runit Dome* into the environment. The intent of the P.L. is to support efforts to conduct periodic visual surveys of Runit Dome and implement a groundwater monitoring program on Runit Island. Findings from these studies are expected to provide a basis for quantifying the risk posed by leakage of radioactive waste from *Runit Dome* on the long-term health status of the people of Enewetak.
- ❑ The radiologic inventory buried beneath *Runit Dome* is dwarfed by the current inventory of fallout radionuclides in atoll lagoon sediments. Consequently, catastrophic failure of the concrete dome façade covering the debris mound and instantaneous release of all its contents into the lagoon will not necessarily lead to any significant change in the radiation dose delivered to the local resident population. However, current findings confirm there is a rapid tidal response in the height of groundwater beneath the containment structure. Therefore, under a more plausible release scenario, the potential does exist for contaminated groundwater from *Runit Dome* to flow into the nearby, subsurface marine environment. Similarly, uncertainties do remain about the total inventory and isotopic mix of fallout radionuclides contained in, and on the nature, integrity and potential to mobilize radionuclides from, the aged waste pile.

- ❑ Any contaminated groundwater from beneath *Runit Dome* that reaches outflow points in the lagoon or on the ocean reef will be very rapidly diluted. Under this scenario, there will likely be little or no measureable or discernible increase in the radiation burden delivered to marine biota or the local human population on Enewetak. As such, historical studies have generally been dismissive about possible hazards associated with *Runit Dome* by use of a simple inventory argument and the rapid turnover time of sea water inside the lagoon. Such arguments have failed to alleviate the concerns of the people of Enewetak and its leadership.
- ❑ The groundwater monitoring program conducted under P.L. 112–149 is intended to support the development of a conceptual model of groundwater flow and mass-transport of radionuclides from *Runit Dome* under different release scenarios. The initial phase of the project will focus on developing baseline measurement data on the time-evolution of water quality in the near-field, subsurface environment around *Runit Dome*. This high-resolution, contemporary measurement data will also be used to study the impact of forcing events such as tidal surges and storms on groundwater flow and mass-transport of radionuclides. These data and information are keys to providing understanding and interpretation of any long-term trends in groundwater quality inside and around *Runit Dome*. In this way, the groundwater monitoring program will support the development of a full and comprehensive assessment of the potential health and ecological impacts of any leakage of radioactive waste from *Runit Dome*, without relying on simple inventory arguments based upon the remobilization of radionuclides contained in lagoon sediments. In a very simplistic way, the groundwater monitoring program implemented under P.L. 112–149 could be viewed and presented publically as an ‘early warning’ system to assess significant changes in water quality before any radioactive material necessarily leaves the site boundary. As such, the groundwater monitoring program in and around Runit Dome will support U.S. agency efforts to address the concerns of the Enewetak community in a more direct and definitive manner, and help build public confidence in the maintenance of a safe and sustainable resettlement program.
- ❑ If the Cactus crater concrete containment structure on Runit Island were located in the United States proper (or subjected to U.S. regulatory authority), it would be formally classified as a Low-Level Radioactive Waste Disposal Site and be subject to stringent site management and monitoring practices. A long-term groundwater monitoring program would almost certainly form an integral part of these activities.
- ❑ The current visual survey took place between 29 May and 5 June of 2013 in partial fulfillment of clause (B)(i)(I) of the P.L. to perform a visual study of the concrete exterior of the Cactus crater concrete containment structure on Runit Island.
- ❑ The concrete cap covering *Runit Dome* appears to be structurally sound in providing an effective and erosion resistant crypt to seal off the radioactive material below.
- ❑ Some visually-defective elements were identified during the visual survey, including cracks and spalls in the concrete cap, and recommendations put forward for their repair. These actions are considered essential for two key reasons;

- (i) To reduce the potential for rainwater infiltration down through the cracks in the dome and possibly influencing groundwater flow and radionuclide migration into the subsurface, marine environment; and
 - (ii) To alleviate negative public perception that the overall effectiveness of the structure is compromised and allowing potentially harmful quantities of radioactivity becoming available for human exposure.
- It is only after drilling a suitable network of groundwater sampling wells that a work program can be devised and implemented to meet the intent of P.L. 112-149 in a scientifically meaningful and defensible manner.
 - In the interim, the environmental and human monitoring programs supported by the U.S. DOE should be continued to ensure that the people of Enewetak are being adequately protected from all possible routes of radiation exposure, including that associated with leakage of radioactive waste from *Runit Dome*.

Encl. Full Report, on CD.

